wherein the combination of the inhibitor of CXCR4 and the inhibitor of GPCRx induces an enhanced amount of stem cell mobilization relative to the amount of stem cell mobilization induced by the CXCR4 inhibitor only.

176. A method of claim **175**, wherein the subject has a CXCR4 protomer and a GPCRx protomer in the stem cell.

177. A method of claim **176**, wherein the subject has a CXCR4-GPCRx heteromer in the stem cell.

178. A method of mobilizing a stem cell in a subject having a CXCR4-GPCRx heteromer in the stem cell, the method comprising:

administering to the cancer patient an inhibitor of CXCR4 and an inhibitor of GPCRx;

wherein:

i) the CXCR4-GPCRx heteromer has an enhanced amount of downstream calcium mobilization relative to downstream calcium mobilization from a CXCR4 protomer or GPCRx protomer; and

ii) the administered combination of inhibitors suppresses the enhanced downstream calcium mobilization from said CXCR4-GPCRx heteromer in the stem cell.

179. The method of claim **178**, wherein the enhanced amount of calcium mobilization from the CXCR4-GPCRx heteromer is a calcium mobilization amount that, upon co-stimulation with the CXCL12 and the respective selective GPCRx agonist, is at least 10% greater than the sum of calcium mobilization amounts resulting from single agonist stimulation of said cells with either the CXCL12 or the respective selective GPCRx agonist, as determined via a calcium mobilization assay.

180. The method of any one of claims **174**, **175**, and **178**, wherein the CXCR4 inhibitor is selected from the group consisting of: AD-114, AD-114-6H, AD-114-Im7-FH, AD-114-PA600-6H, AD-214, ALX-0651, ALX40-4C, AMD070 (AMD11070, X4P-001), AMD3100 (plerixafor), AMD3465, ATI 2341, BKT140 (BL-8040; TF14016; 4F-Benzoyl-TN14003), CTCE-9908, CX549, D-[Lys3] GHRP-6, FC122, FC131, GMI-1359, GSK812397, GST-NT21MP, isothiourea-1a, isothiourea-1t (IT1t), KRH-1636, KRH-3955, LY2510924, LY2624587, MSX-122, N-[11C] Methyl-AMD3465, PF-06747143, POL6326, SDF-1 1-9 [P2G] dimer, SDF1 P2G, T134, T140, T22, TC 14012, TG-0054 (Burixafor), USL311, ulocuplumab (MDX1338/BMS-936564), viral macrophage inflammatory protein-II (vMIP-II), WZ811, 12G5, 238D2, 238D4, [64Cu]-AMD3100, [64Cu]-AMD3465, [68Ga]pentixafor, [90Y] pentixather, [99mTc]O_2-AMD3100, [177Lu]pentixather, and 508MCl (Compound 26).

181. The method of claim **180**, wherein the CXCR4 inhibitor is selected from the group consisting of: AD-214, AMD070 (AMD11070, X4P-001), AMD3100 (plerixafor), BKT140 (BL-8040; TF14016; 4F-Benzoyl-TN14003), CTCE-9908, LY2510924, LY2624587, T140, TG-0054 (Burixafor), PF-06747143, POL6326, and ulocuplumab (MDX1338/BMS-936564).

182. The method of any one of claims **174**, **175**, and **178**, wherein the GPCRx is selected from the group consisting of: ADCYAP1R1, ADORA2B, ADORA3, ADRB2, C5AR1, CALCR, CHRM1, EDNRB, HRH1, MLNR, NTSR1, and TACR3.

183. The method of any one of claims **174**, **175**, and **178**, wherein the stem cell is selected from the group consisting of a hematopoietic stem cell, a hematopoietic progenitor cell, a mesenchymal stem cell, an endothelial progenitor cell, a neural stem cell, an epithelial stem cell, a skin stem cell, and a cancer stem cell.

184. The method of claim **183**, where in the stem cell is a hematopoietic stem cell or a hematopoietic progenitor cell.

185. The method of claim **184**, wherein the hematopoietic stem cell or the hematopoietic progenitor cell is mobilized from bone marrow to peripheral blood.

186. The method of claim **185**, wherein the mobilized hematopoietic stem cell or hematopoietic progenitor cell is collected for transplantation to a cancer patient.

187. The method of claim **186**, wherein the cancer is selected from the group consisting of lymphoma, leukemia, and myeloma.

188. The method of claim **187**, wherein the cancer is non-Hodgkin lymphoma (NHL), acute myeloid leukemia (AML), acute lymphoblastic leukemia (ALL), or multiple myeloma (MM).

189. The method of claim **183**, where in the stem cell is a mesenchymal stem cell.

190. The method of claim **189**, wherein the mesenchymal stem cell is mobilized from bone marrow to peripheral blood.

191. The method of claim **190**, wherein the mesenchymal stem cell is mobilized for treatment of a condition selected from the group consisting of neurological disorder, cardiac ischemia, myocardial infarction, diabetes, tissue repair, bone and cartilage disease, autoimmune disease, graft versus host disease, Crohn's disease, multiple sclerosis, systemic lupus erythematosus, and systemic sclerosis.

192. The method of claim **183**, wherein the stem cell is a cancer stem cell.

193. The method of claim **192**, wherein the cancer stem cell is mobilized into blood.

194. The method of claim **193**, wherein the cancer stem cell is mobilized for treatment of a cancer.

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